

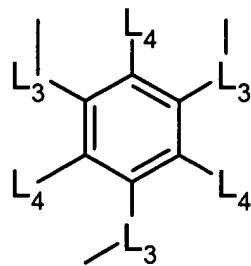
IN THE CLAIMS

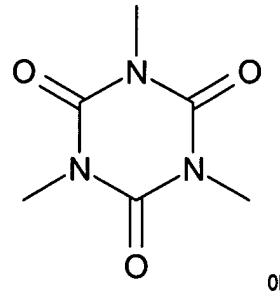
The text of all claims under examination is submitted, and the status of each is identified. This listing of claims replaces all prior versions, and listings, of claims in the application.

1-18. (cancelled).

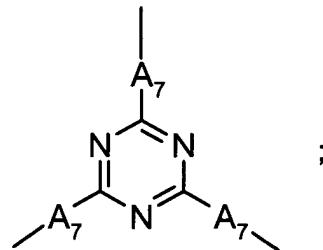
19. (currently amended): ~~Protective clothing or mask or irradiation indicating tag, wherein a~~ A polymer material comprising components (a) and (b) in form of a fiber, textile, nonwoven or film is contained on or visibly below the surface of the a protective clothing, a mask or an irradiation indicating tag, wherein

(a) is a compound comprising one or more mono-hydroxyphenyl moieties, each carrying one or two bonds to either a linking group connecting the moiety with 1 to 3 further moieties of the same type or to an anchor group, and optionally 1-3 further substituents selected from alkyl of 1 to 12 carbon atoms, where the linking groups are di-, tri- or tetravalent aliphatic groups of 1 to 20 carbon atoms and divalent linking groups are selected from alkylene which may be interrupted and/or end-capped with -O-, -NH-, -S-, -CO-, -COO-, -OCO-, -NHCO-, -CONH-, a group L₁, phenylene or phenyleno which is substituted by C₁-C₁₂alkyl and/or C₁-C₁₂alkoxy and/or C₂-C₁₂alkanoyloxy and/or C₃-C₁₂alkenoyloxy; divalent mono-, di- or tricycloalkylene groups; divalent mono-, di- or tricycloalkylene groups interrupted by -O-; -O-; -NH-; -S-; -CO-; -COO-; -OCO-; -NHCO-; and -CONH-; trivalent groups are selected from trivalent alkyl groups of 3 to 20 carbon atoms; said trivalent alkyl groups interrupted and/or end-capped with -O-, -NH-, -S-, -CO-, -COO-, -OCO-, -NHCO-, -CONH-, a group L₁, phenylene or phenyleno which is substituted by C₁-C₁₂alkyl and/or C₁-C₁₂alkoxy and/or C₂-C₁₂alkanoyloxy and/or C₃-C₁₂alkenoyloxy; and trivalent groups of the formulae



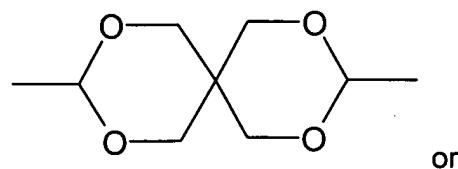
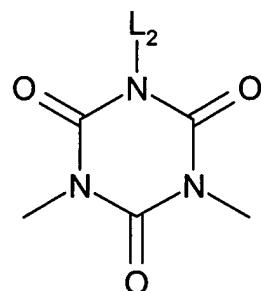


or

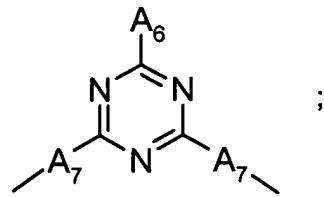


tetravalent groups are selected from tetravalent alkyl groups of 4 to 20 carbon atoms; and said tetravalent alkyl groups interrupted and/or end-capped with -O-, -NH-, -S-, -CO-, -COO-, -OCO-, -NHCO-, -CONH-, a group L₁, phenylene or phenylene which is substituted by C₁-C₁₂alkyl and/or C₁-C₁₂alkoxy and/or C₂-C₁₂alkanoyloxy and/or C₃-C₁₂alkenoyloxy; wherein

L₁ is a group selected from the formulae



or



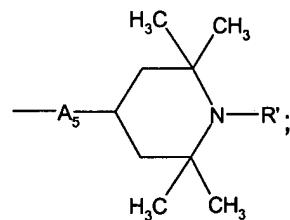
L₂ is OH, C₁-C₁₂alkyl, C₁-C₁₂alkoxy, C₂-C₁₂hydroxyalkyl; C₂-C₁₂hydroxyalkoxy;

L₃ independently are C₁-C₄alkylene;

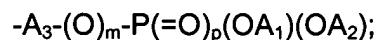
L₄ independently are H or C₁-C₄alkyl; and

anchor groups are selected from

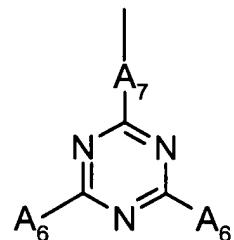
C₁-C₂₂alkyl; C₁-C₂₂alkyl-A₅-; C₂-C₂₂alkyl interrupted by -A₅-; -A₄-phenyl; -A₄-phenyl where the phenyl core is substituted by C₁-C₁₂alkyl, C₁-C₁₂alkoxy, C₂-C₁₂alkanoyloxy and/or C₃-C₁₂alkenoyloxy; C₁-C₈alkyl substituted by a group of the formula



phosphite, phosphate or phosphonate ester groups, of the formula



or the anchor group is of the formula



where m and p independently are 0 or 1;

A₁ and A₂ independently are C₁-C₁₂alkyl or phenyl or phenyl substituted by C₁-C₁₂alkyl or an equivalent of an alkaline, alkaline earth or aluminum atom;

A₃ is a direct bond or C₁-C₈alkylene;

A₄ is selected from C₁-C₈alkylene and A₅;

A₅ is selected from -O-, -NH-, -S-, -CO-, -COO-, -OCO-, -NHCO- and -CONH-;

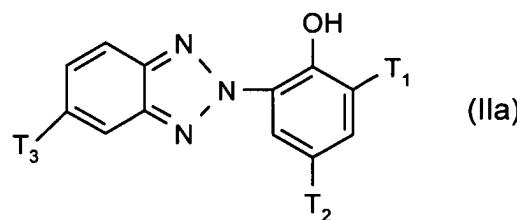
A₆ is selected from C₁-C₁₈alkoxy, C₁-C₁₈alkylthio and C₁-C₁₈alkylamino;

A₇ is -O- or -NH-;

R' is H, C₁-C₁₈alkyl, C₁-C₁₈alkoxy or cyclohexyloxy;

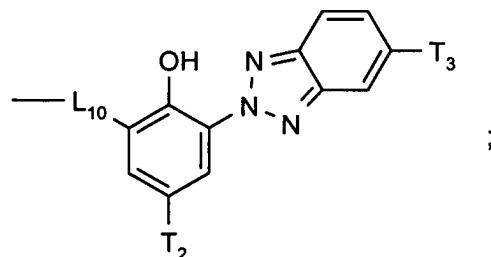
or the anchor group is C₃-C₂₂alkylene or C₃-C₂₂oxaalkylene attached with both open bonds to adjacent carbon atoms of the mono-hydroxyphenyl moiety; or

component (a) can also be a phenolic UV absorber compound selected from benzotriazoles of the formula (IIa), 2-hydroxybenzophenones of the formula (IIb) and 2-hydroxyphenyltriazines of formula (IIc):



wherein T₁ is hydrogen, C₁-C₁₈alkyl, or C₁-C₁₈alkyl which is substituted by phenyl,

or T₁ is a group of the formula



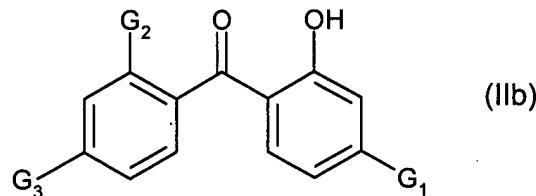
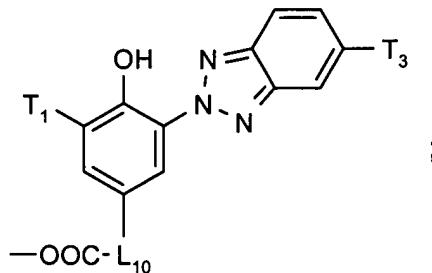
L₁₀ is a divalent group -(CH₂)_n- , where n is from the range 1-8;

T₂ is hydrogen, C₁-C₁₈alkyl, or is C₁-C₁₈alkyl which is substituted by COOT₅, C₁-C₁₈alkoxy, hydroxyl, phenyl or C₂-C₁₈acyloxy;

T_3 is hydrogen, halogen, C_1-C_{18} alkyl, C_1-C_{18} alkoxy, C_2-C_{18} acyloxy, perfluoroalkyl of 1 to 12 carbon atoms , or T_3 is phenyl; and

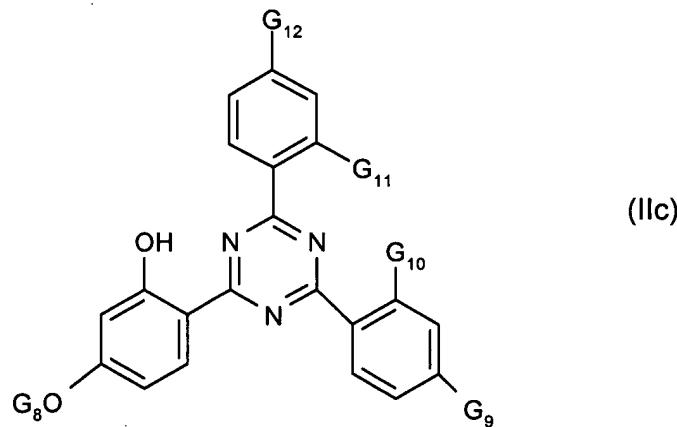
T_5 is C_1-C_{18} alkyl or C_4-C_{50} alkyl interrupted by one or more O and/or substituted by OH or

by a group



wherein

G_1 , G_2 and G_3 independently are hydrogen, hydroxy or C_1-C_{18} alkoxy;



wherein

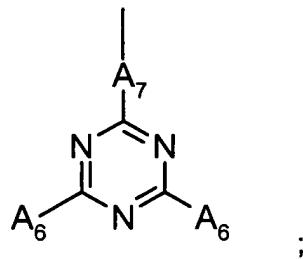
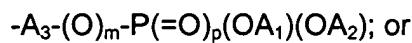
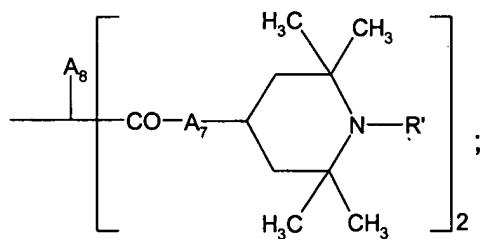
G_8 is C_1-C_{18} alkyl, or is C_4-C_{18} alkyl which is interrupted by COO or OCO or O, or is interrupted by O and substituted by OH; and

G_9 , G_{10} , G_{11} and G_{12} independently are hydrogen, methyl, hydroxy or OG_8 ; and G_9 and G_{12} also comprise phenyl; and

(b) is a colour former,
wherein said protective clothing, mask or irradiation indicating tag undergoes an irreversible color change upon exposure to irradiation.

20. (currently amended): The polymer material according to claim 19, Protective clothing or mask or irradiation indicating tag according to claim 19, wherein the irradiation radiation is of higher energy than visible light and is selected from ultraviolet light, X-ray, gamma radiation and particle radiation[.] especially from ultraviolet laser or ultraviolet lamp radiation of 285 to 400 nm, electron radiation, X-ray and gamma radiation.

21. (withdrawn): Protective clothing or mask or irradiation indicating tag according to claim 19, wherein the anchor groups are selected from tertiary C₄-C₁₂alkyl; C₁-C₂₂alkyl-A₅-; C₂-C₂₂alkyl interrupted by -A₅-; -A₅-phenyl; -A₅-phenyl where the phenyl core is substituted by C₁-C₁₂alkyl; and -A₄-phenyl where the phenyl core is substituted by C₂-C₁₂alkanoyloxy and/or C₃-C₁₂alkenoyloxy, and optionally further by C₁-C₁₂alkyl; or the anchor group is C₃-C₂₂alkylene or C₃-C₂₂oxaalkylene attached with both open bonds to adjacent carbon atoms of the mono-hydroxyphenyl moiety; or is a group of one the formulae



where m and p independently are 0 or 1;

A_1 and A_2 independently are C_1 - C_{12} alkyl or phenyl or phenyl substituted by C_1 - C_{12} alkyl or an equivalent of an alkaline, alkaline earth or aluminum atom;

A_3 is a direct bond or C_1 - C_8 alkylene;

A_4 is selected from C_1 - C_8 alkylene, -O-, -NH-, -S-, -CO-, -COO-, -OCO-, -NHCO- and -CONH-;

A_5 is selected from -O-, -NH-, -S-, -CO-, -COO-, -OCO-, -NHCO- and -CONH-;

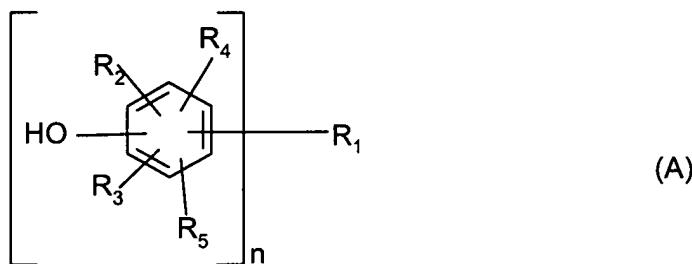
A_6 is selected from C_1 - C_{18} alkoxy, C_1 - C_{18} alkylthio and C_1 - C_{18} alkylamino;

A_7 is -O- or -NH-;

A_8 is C_1 - C_7 alkyl; and

R' is C_1 - C_{18} alkyl.

22. (currently amended): The polymer material Protective clothing or mask or irradiation indicating tag according to claim 19, wherein component (a) is a compound of the formula (A)



wherein

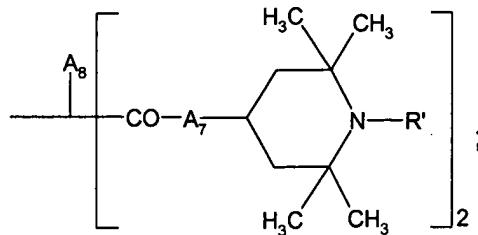
R_2 , R_3 , R_4 and R_5 independently are hydrogen, methyl or tertiary C_4 - C_{12} alkyl;

n is from the range 1-4:

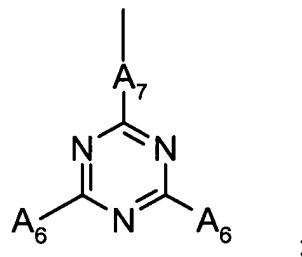
when n is 1,

R_1 is tertiary C_4 - C_{12} alkyl; C_1 - C_{22} alkyl- A_5 -; C_2 - C_{22} alkyl interrupted by - A_5 -; - A_5 -phenyl; - A_5 -phenyl where the phenyl core is substituted by C_1 - C_{12} alkyl; - A_4 -phenyl where the phenyl core is substituted by C_2 - C_{12} alkanoyloxy and/or C_3 - C_{12} alkenoyloxy, and optionally further by

C_1 - C_{12} alkyl; or R_1 together with R_5 is C_3 - C_{22} alkylene or C_3 - C_{22} oxaalkylene attached with both open bonds to adjacent carbon atoms of the mono-hydroxyphenyl moiety; or is a group of one the formulae



$-\text{A}_3-(\text{O})_m-\text{P}(=\text{O})_p(\text{OA}_1)(\text{OA}_2)$; or



where m and p independently are 0 or 1;

A_1 and A_2 independently are $\text{C}_1\text{-}\text{C}_{12}$ alkyl or phenyl or phenyl substituted by $\text{C}_1\text{-}\text{C}_{12}$ alkyl or an equivalent of an alkaline, alkaline earth or aluminum atom;

A_3 is a direct bond or $\text{C}_1\text{-}\text{C}_8$ alkylene;

A_4 is selected from $\text{C}_1\text{-}\text{C}_8$ alkylene, $-\text{O}-$, $-\text{NH}-$, $-\text{S}-$, $-\text{CO}-$, $-\text{COO}-$, $-\text{OCO}-$, $-\text{NHCO}-$ and $-\text{CONH}-$;

A_5 is selected from $-\text{O}-$, $-\text{NH}-$, $-\text{S}-$, $-\text{CO}-$, $-\text{COO}-$, $-\text{OCO}-$, $-\text{NHCO}-$ and $-\text{CONH}-$;

A_6 is selected from $\text{C}_1\text{-}\text{C}_{18}$ alkoxy, $\text{C}_1\text{-}\text{C}_{18}$ alkylthio and $\text{C}_1\text{-}\text{C}_{18}$ alkylamino;

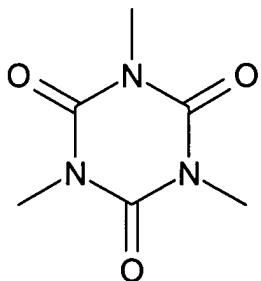
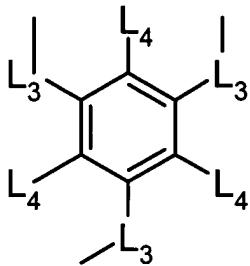
A_7 is $-\text{O}-$ or $-\text{NH}-$;

A_8 is $\text{C}_1\text{-}\text{C}_7$ alkyl; and

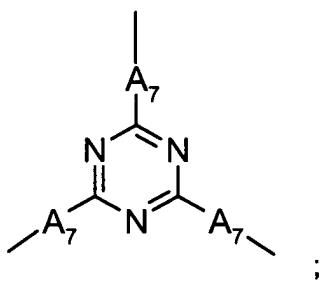
R' is $\text{C}_1\text{-}\text{C}_{18}$ alkyl;

when n is 2, R_1 is $\text{C}_1\text{-}\text{C}_{20}$ alkylene which may be interrupted and/or end-capped with $-\text{O}-$, $-\text{NH}-$, $-\text{S}-$, $-\text{CO}-$, $-\text{COO}-$, $-\text{OCO}-$, $-\text{NHCO}-$, $-\text{CONH}-$, $-\text{L}_1-$, phenylene, phenylene which is substituted by $\text{C}_1\text{-}\text{C}_{12}$ alkyl and/or $\text{C}_1\text{-}\text{C}_{12}$ alkoxy and/or $\text{C}_2\text{-}\text{C}_{12}$ alkanoyloxy and/or $\text{C}_3\text{-}\text{C}_{12}$ alkenoyloxy; divalent mono-, di- or tricycloalkylene groups; divalent mono-, di- or tricycloalkylene groups interrupted by $-\text{O}-$; $-\text{O}-$; $-\text{NH}-$; $-\text{S}-$; $-\text{CO}-$; $-\text{COO}-$; $-\text{OCO}-$; $-\text{NHCO}-$; or $-\text{CONH}-$;

when n is 3, R₁ is trivalent alkyl of 3 to 20 carbon atoms; said trivalent alkyl interrupted or end-capped with -O-, -NH-, -S-, -CO-, -COO-, -OCO-, -NHCO-, -CONH-, -L₁-, phenylene or phenylene which is substituted by C₁-C₁₂alkyl and/or C₁-C₁₂alkoxy and/or C₂-C₁₂alkanoyloxy and/or C₃-C₁₂alkenoyloxy; or trivalent groups of the formulae

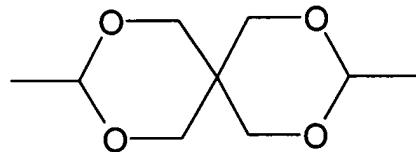
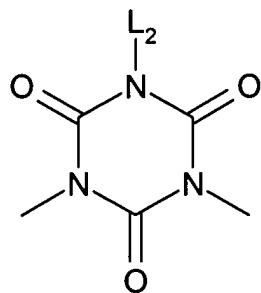


or

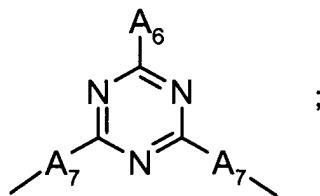


when n is 4, R₁ is tetravalent alkyl of 4 to 20 carbon atoms; said tetravalent alkyl interrupted or end-capped with -O-, -NH-, -S-, -CO-, -COO-, -OCO-, -NHCO-, -CONH-, -L₁-, phenylene or phenylene which is substituted by C₁-C₁₂alkyl and/or C₁-C₁₂alkoxy and/or C₂-C₁₂alkanoyloxy and/or C₃-C₁₂alkenoyloxy;

L₁ is a group selected from the formulae



and



L_2 is OH, $\text{C}_1\text{-C}_{12}$ alkyl, $\text{C}_1\text{-C}_{12}$ alkoxy, $\text{C}_2\text{-C}_{12}$ hydroxyalkyl; or $\text{C}_2\text{-C}_{12}$ hydroxyalkoxy;

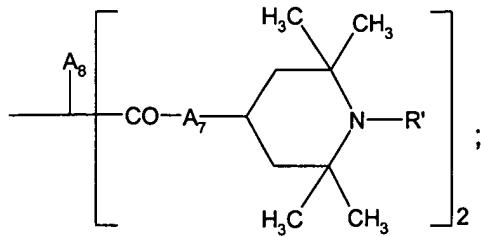
L_3 independently are $\text{C}_1\text{-C}_4$ alkylene; and

L_4 independently are H or $\text{C}_1\text{-C}_4$ alkyl.

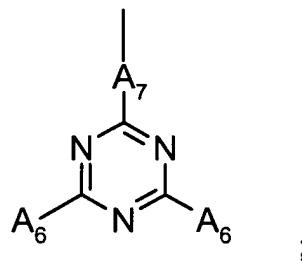
23. (currently amended): The polymer material Protective clothing or mask or irradiation indicating tag according to claim 22, wherein R_2 , R_3 , R_4 and R_5 independently are hydrogen, methyl, tert-butyl or tert-pentyl;

when n is 1,

R_1 is tertiary butyl, tertiary pentyl; $\text{C}_1\text{-C}_{22}$ alkyl- A_5 -; $\text{C}_2\text{-C}_{22}$ alkyl interrupted by $-\text{A}_5-$; $-\text{A}_5$ -phenyl where the phenyl core is substituted by $\text{C}_1\text{-C}_{12}$ alkyl; $-\text{A}_4$ -phenyl where the phenyl core is substituted by $\text{C}_3\text{-C}_4$ alkenoyloxy and $\text{C}_1\text{-C}_{12}$ alkyl; or R_1 together with R_5 is $\text{C}_3\text{-C}_{22}$ alkylene or $\text{C}_3\text{-C}_{22}$ oxaalkylene attached with both open bonds to adjacent carbon atoms of the mono-hydroxyphenyl moiety; or R_1 is a group of one the formulae



-A₃-P(=O)(OA₁)(OA₂); or



where

A₁ and A₂ independently are C₁-C₄alkyl or an equivalent of a metal atom selected from Li, Na, K, ½ Mg, ½ Ca and 1/3 Al;

A₃ is methylene;

A₄ is C₁-C₈alkylene;

A₅ is selected from -O-, -S-, -COO-, -OCO-, -NHCO- and -CONH-;

A₆ is selected from C₄-C₁₈alkylthio and C₄-C₁₈alkylamino;

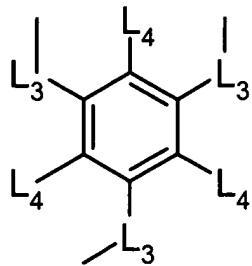
A₇ is -NH-;

A₈ is C₁-C₇alkyl; and

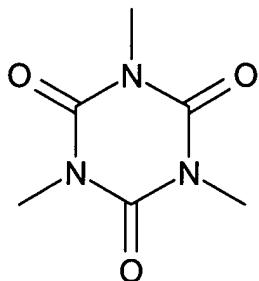
R' is C₁-C₁₈alkyl;

when n is 2, R₁ is C₁-C₁₂alkylene; C₂-C₂₀alkylene interrupted and/or end-capped with -O-, -S-, -COO-, -OCO-, -NHCO-, -CONH- or -L₁-; or R₁ is a divalent mono-, di- or tricycloalkylene group; or R₁ is -O-; -NH-; or -S-;

when n is 3, R₁ is trivalent alkyl of 3 to 20 carbon atoms; said trivalent alkyl interrupted by -O-, -S-, -COO-, -OCO-, -NHCO-, -CONH-, phenylene or phenylene which is substituted by C₁-C₁₂alkyl; or R₁ is a trivalent group of one of the formulae



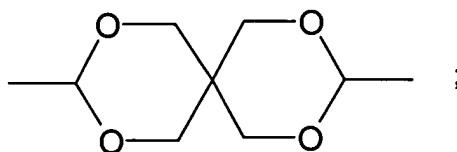
or



;

when n is 4, R₁ is tetravalent alkyl of 4 to 20 carbon atoms; or said tetravalent alkyl interrupted by -O-, -S-, -COO-, -OCO-, -NHCO- or -CONH-; and

L₁ is a group of the formula



L₃ independently are C₁-C₄alkylene; and

L₄ independently are H or C₁-C₄alkyl.

24. (currently amended): The polymer material ~~Protective clothing or mask or irradiation indicating tag~~ according to claim 19, wherein the colour former is a triphenylmethane, lactone, benzoxazine, spiropyran, fluoran or phthalide.

25. (currently amended): The polymer material ~~Protective clothing or mask or irradiation indicating tag~~ according to claim 19, wherein the polymeric material contains 0.001 to 10 % by weight of the phenolic antioxidant and/or phenolic UVA, based on the total weight of the polymeric material.

26. (currently amended): The polymer material ~~Protective clothing or mask or irradiation indicating tag~~ according to claim 19, wherein the polymeric material contains 0.001 to 10 % by weight of the colour former with respect to the total weight of the polymeric material.

27. (currently amended): ~~The polymer material Protective clothing or mask or irradiation indicating tag according to claim 26, wherein the polymeric material contains 0.01 to 5 % by weight of the colour former with respect to the total weight of the polymeric material.~~

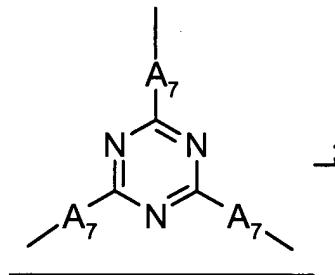
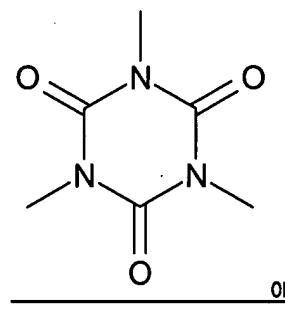
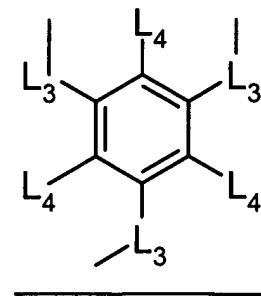
28. (currently amended): ~~The polymer material Protective clothing or mask or irradiation indicating tag according to claim 19, wherein the polymeric material is a transparent thermoplast.~~

29. (currently amended): ~~The polymer material Protective clothing or mask or irradiation indicating tag according to claim 19, wherein the polymeric material is selected from styrene acrylonitrile copolymer, polyolefin, polyvinylchloride, polychlorobutadiene, polyesters and glycol modified polyesters, polyacrylics, polystyrene, acrylonitrile styrene acrylate copolymer, polyamide, acrylonitrile styrene butadiene copolymer, polycarbonate and blends or alloys thereof.~~

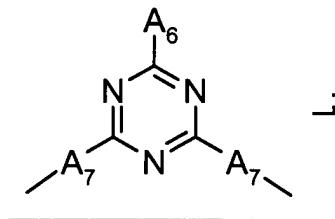
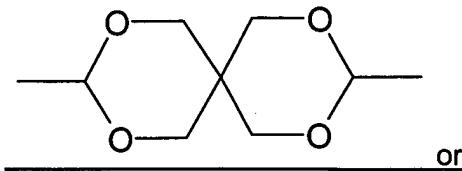
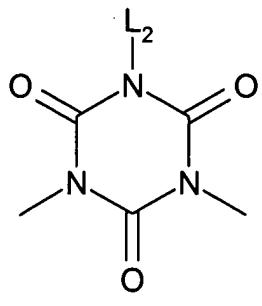
30. (currently amended): Process for monitoring irradiation by X-ray or radioactive material, which process comprises placing a tag or sample of a polymer material comprising components (a) and (b) according to claim 19 in the site to be controlled, and subsequently checking the colour of the tag or sample,

wherein

(a) is a compound comprising one or more mono-hydroxyphenyl moieties, each carrying one or two bonds to either a linking group connecting the moiety with 1 to 3 further moieties of the same type or to an anchor group, and optionally 1-3 further substituents selected from alkyl of 1 to 12 carbon atoms, where the linking groups are di-, tri- or tetravalent aliphatic groups of 1 to 20 carbon atoms and divalent linking groups are selected from alkylene which may be interrupted and/or end-capped with -O-, -NH-, -S-, -CO-, -COO-, -OCO-, -NHCO-, -CONH-, a group L₁, phenylene or phenyleno which is substituted by C₁-C₁₂alkyl and/or C₁-C₁₂alkoxy and/or C₂-C₁₂alkanoyloxy and/or C₃-C₁₂alkenoyloxy; divalent mono-, di- or tricycloalkylene groups; divalent mono-, di- or tricycloalkylene groups interrupted by -O-; -O-; -NH-; -S-; -CO-; -COO-; -OCO-; -NHCO-; and -CONH-; trivalent groups are selected from trivalent alkyl groups of 3 to 20 carbon atoms; said trivalent alkyl groups interrupted and/or end-capped with -O-, -NH-, -S-, -CO-, -COO-, -OCO-, -NHCO-, -CONH-, a group L₁, phenylene or phenyleno which is substituted by C₁-C₁₂alkyl and/or C₁-C₁₂alkoxy and/or C₂-C₁₂alkanoyloxy and/or C₃-C₁₂alkenoyloxy; and trivalent groups of the formulae



tetravalent groups are selected from tetravalent alkyl groups of 4 to 20 carbon atoms; and
said tetravalent alkyl groups interrupted and/or end-capped with -O-, -NH-, -S-, -CO-, -
COO-, -OCO-, -NHCO-, -CONH-, a group L₁, phenylene or phenylene which is substituted
by C₁-C₁₂alkyl and/or C₁-C₁₂alkoxy and/or C₂-C₁₂alkanoyloxy and/or C₃-C₁₂alkenoyloxy;
wherein
L₁ is a group selected from the formulae



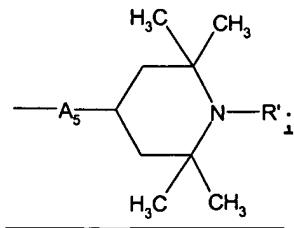
L₂ is OH, C₁-C₁₂alkyl, C₁-C₁₂alkoxy, C₂-C₁₂hydroxyalkyl; C₂-C₁₂hydroxyalkoxy;

L₃ independently are C₁-C₄alkylene;

L₄ independently are H or C₁-C₄alkyl; and

anchor groups are selected from

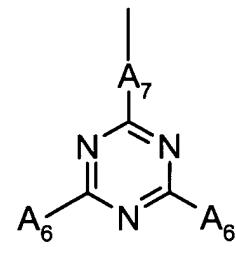
C₁-C₂₂alkyl; C₁-C₂₂alkyl-A₅; C₂-C₂₂alkyl interrupted by -A₅-; -A₄-phenyl; -A₄-phenyl where the phenyl core is substituted by C₁-C₁₂alkyl, C₁-C₁₂alkoxy, C₂-C₁₂alkanoyloxy and/or C₃-C₁₂alkenoyloxy; C₁-C₈alkyl substituted by a group of the formula



phosphite, phosphate or phosphonate ester groups, of the formula

-A₃-(O)_m-P(=O)_p(OA₁)(OA₂);

or the anchor group is of the formula



where m and p independently are 0 or 1;

A₁ and A₂ independently are C₁-C₁₂alkyl or phenyl or phenyl substituted by C₁-C₁₂alkyl or an equivalent of an alkaline, alkaline earth or aluminum atom;

A₃ is a direct bond or C₁-C₈alkylene;

A₄ is selected from C₁-C₈alkylene and A₅;

A₅ is selected from -O-, -NH-, -S-, -CO-, -COO-, -OCO-, -NHCO- and -CONH-;

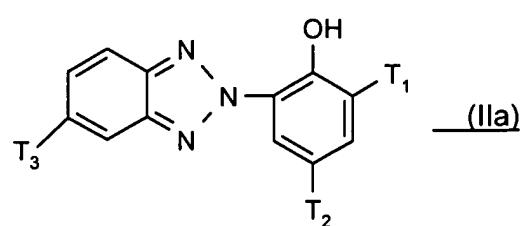
A₆ is selected from C₁-C₁₈alkoxy, C₁-C₁₈alkylthio and C₁-C₁₈alkylamino;

A₇ is -O- or -NH-;

R' is H, C₁-C₁₈alkyl, C₁-C₁₈alkoxy or cyclohexyloxy;

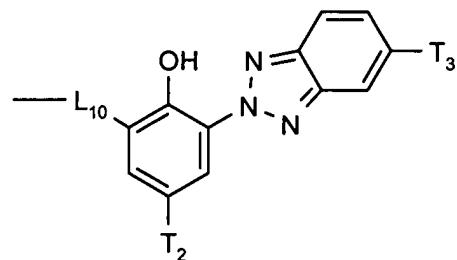
or the anchor group is C₃-C₂₂alkylene or C₃-C₂₂oxaalkylene attached with both open bonds to adjacent carbon atoms of the mono-hydroxyphenyl moiety; or

component (a) can also be a phenolic UV absorber compound selected from benzotriazoles of the formula (IIa), 2-hydroxybenzophenones of the formula (IIb) and 2-hydroxyphenyltriazines of formula (IIc);



wherein T₁ is hydrogen, C₁-C₁₈alkyl, or C₁-C₁₈alkyl which is substituted by phenyl,

or T₁ is a group of the formula



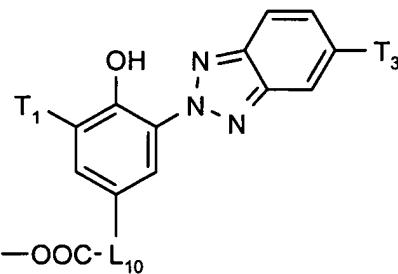
L₁₀ is a divalent group -(CH₂)_n- , where n is from the range 1-8;

T₂ is hydrogen, C₁-C₁₈alkyl, or is C₁-C₁₈alkyl which is substituted by COOT₅, C₁-C₁₈alkoxy, hydroxyl, phenyl or C₂-C₁₈acyloxy;

T₃ is hydrogen, halogen, C₁-C₁₈alkyl, C₁-C₁₈alkoxy, C₂-C₁₈acyloxy, perfluoroalkyl of 1 to 12 carbon atoms , or T₃ is phenyl; and

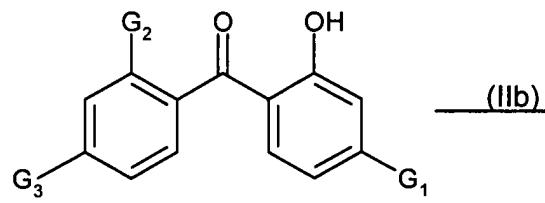
T₅ is C₁-C₁₈alkyl or C₄-C₅₀alkyl interrupted by one or more O and/or substituted by OH or

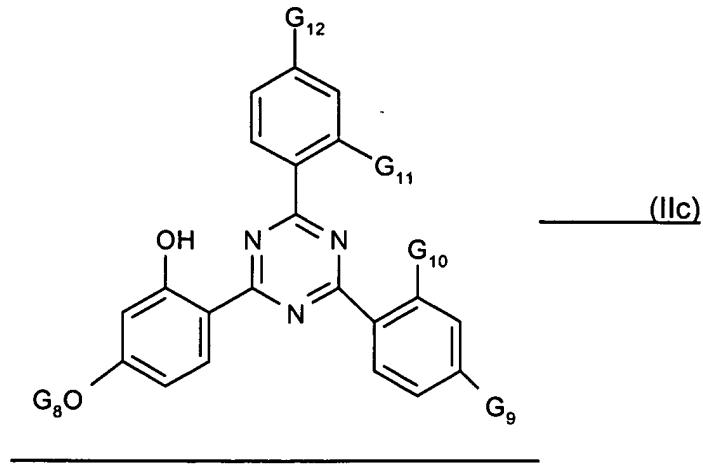
by a group



wherein

G₁, G₂ and G₃ independently are hydrogen, hydroxy or C₁-C₁₈alkoxy;





wherein

G₈ is C₁-C₁₈alkyl, or is C₄-C₁₈alkyl which is interrupted by COO or OCO or O, or is interrupted by O and substituted by OH; and

G₉, G₁₀, G₁₁ and G₁₂ independently are hydrogen, methyl, hydroxy or OG₈; and G₉ and G₁₂ also comprise phenyl; and

(b) is a colour former.

31. (new): The process according to claim 30, wherein a) and b) are in the form of a fiber, textile, nonwoven or film contained on or visibly below a surface of a protective clothing, a mask or an irradiation indicating tag,

and said protective clothing, mask or irradiation indicating tag undergoes an irreversible color change upon exposure to irradiation.

32. (new): The polymer material according to claim 20, wherein the irradiation is from ultraviolet laser or ultraviolet lamp radiation of 285 to 400 nm, electron radiation, X-ray and gamma radiation.